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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/031,216	01/11/2002	Bonnie R. Hames	NREL 98-22	8168

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EXAMINER
SRIVASTAVA, KAILASH C

ART UNIT	PAPER NUMBER
1651	

DATE MAILED: 09/17/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/031,216	HAMES ET AL.	
	Examiner	Art Unit	
	Dr. Kailash C. Srivastava	1651	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 January 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3 and 5-10* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3 and 5-10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

1. Please note that the correct Serial Number and filing date of your Application under prosecution is 10/031,216, filed on January 11, 2002 not PCT/US01/11825 filed on April 10, 2001 as recited in the Preliminary Amendment and Information Disclosures filed on 11 January 2002. Applicants should also note that this application has been assigned to Group Art Unit 1651. Please ensure that the correct U.S. Serial Number, filing date and Group Art Unit for this application is cited in all future correspondence with this Office.

2. The assigned Examiner to your application in the USPTO is Dr. Kailash C. Srivastava. To aid in correlating any papers for this application, all further correspondence regarding this application should be directed to Examiner K.C. Srivastava in Art Unit 1651.3. Applicants' Preliminary amendment filed February 27, 2003 as Paper Number 4 is acknowledged and entered.

4. Claims 1, 3 and 5-10 are pending.

Information Disclosure Statement

5. Applicants' Information Disclosure (i.e., IDS) filed January 11, 2002 has been made of record and considered.

Priority

6. Applicants' claim for foreign priority under 35 U.S.C. 119 (a-d) and for domestic priority under 35 U.S.C. 119(e) is acknowledged. Based upon filing of U.S. Provisional Application Number 60/195,416, instant non-provisional U. S. Application Number 10/031,216 is given the benefit of filing date of April 10,2000.

Claims Objection

7. Claim 8 is objected to because the phrase, "said biomass hydrolyzate is a softwood and said metal oxide concentration is four times a phenol compound content of said biomass hydolyzate" does not clarify the claimed invention. A "biomass hydrolyzate" cannot be softwood, however, said biomass hydrolyzate can be a "softwood biomass hydrolyzate". Similarly, it is not clear whether the metal oxide concentration is four times the concentration of one single phenol compound in the biomass hydrolyzate, or of all the phenol compounds comprising said biomass hydrolyzate. Appropriate correction is required.

Claim Rejections - 35 U.S.C. § 112

8. The following is a quotation of the second paragraph of 35 U.S.C. § 112:

> ***The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.***

9. Claims 3 and 5-9 are rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

- Claims 3 and 9 are rendered vague and indefinite because of the recitation, "derived" in claims 3 and 9. Said term does not clearly define as to how similar a material should be to the base material (i.e.; lignin) to be called a derivative, i.e. the term does not define the metes and bounds of the claimed subject matter. Examiner suggests using the phrase, "obtained from lignin" in place of the phrase, lignin-derived".

- Claim 6 is unclear because of the abbreviation "*r.*" Abbreviations in the first instance of claims should be expanded upon with the abbreviation indicated in parentheses. The abbreviations can be used thereafter.

- The phrase, "said titanium oxide is twice said phenol compounds of the biomass hydrolyzate" in Claim 7 makes Claim 7 unclear and therefore, indefinite. Applicants are required to clarify the phrase "said titanium oxide is twice said phenol compounds of the biomass hydrolyzate".

Other rejected claims depend directly from the rejected claims (e.g., 3) and are, therefore, also rejected under 35 U.S.C. §112, second paragraph for the reasons set forth above.

Claim Rejections – 35 U.S.C. § 102

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

> ***A person shall be entitled to a patent unless –***
>
> ***(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.***

11. Claims 1, 3, 5 and 10 are rejected under 35 U.S.C. §102(b) as anticipated by Perego et al (Bioprocess Engineering, 1994, Volume 10, Pages 35-41).

Perego et al. teach a method to ferment a biomass (i.e., hardwood) hydrolyzate into ethanol after said biomass hydrolyzate has been pretreated with fly ash (Page 35, Column 2, Lines 9-15 and 23-26) to remove phenolic inhibitors from said biomass hydrolyzate. Perego et al. also teach that during pretreatment step said biomass hydrolyzate is heated to 100°C and subsequently, filtered and the pH of the biomass hydrolyzate is adjusted (Page 36,Column 1, Lines 9-28). Fly ash comprises titanium dioxide (Table 2, Line 10). Thus, Perego et al. teach a method to remove phenolic compounds from a biomass hydrolyzate with addition of titanium dioxide and application of said pretreated biomass hydrolyzate to alcoholic fermentation to produce a fuel, after adjusting the pH of said biomass hydrolyzate, wherein said fuel/chemical is ethanol.

Therefore, the reference deems to anticipate the cited claims.

Claim Rejections - 35 U.S.C. § 103

12. The following is a quotation of 35 U.S.C. §103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> ***(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.***

13. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. § 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. § 103(c) and potential 35 U.S.C. § *102*(f) or (g) prior art under 35 U.S.C.§ 103(a).

14. Claims 1, 3 and 5-10 are rejected under 35 U.S.C. § 103 (a) as obvious over Perego et al. (Bioprocess Engineering, 1994, Volume 10, Pages 35-41) in view of Jeffries et al. (US Patent 6,071,729) and Leonard et al (Industrial and Engineering Chemistry, 1945, Volume 27, Pages 390-395).

Teachings from Perego et al. have been discussed above. Perego et al., however, do not teach the biomass hydrolyzate to be a softwood hydrolyzate, or the fermentative organism to be *Saccharomyces cerevisiae*.

Jeffries et al. teach that softwood or hardwood hydrolyzates may be interchangeably applicable for bioconversion of wood sugars to ethanol (figures 7A or 7B), however, at higher concentration of wood hydrolyzates, softwood hydrolyzate yields almost 10 fold higher ethanol (See Figure 7C). Jeffries et al., however, do not teach the fermentative organism to be *Saccharomyces cerevisiae*.

Leonard et al. teach fermenting pretreated acid hydrolyzate from Douglas fir (i.e., biomass hydrolyzate) into ethanol, wherein pH of said pretreated biomass hydrolyzate is adjusted to 5.8 and subsequently said biomass hydrolyzate is fermented to ethanol by *Saccharomyces cerevisiae* (Page 392, Column 2, Lines 43-55 and Page 395, Column 1, Lines 2-37). Douglas fir is a coniferous tree, and therefore, Leonard et al. teach fermenting a softwood biomass hydrolyzate into a fuel, namely ethanol.

One having ordinary skill in the art would have been motivated to modify the teachings from Perego et al. according to the teachings from Jeffries et al. and Leonard et al. to apply pretreated softwood hydrolyzate to prepare the fermentation medium for the conversion of said biomass hydrolyzate into ethanol via fermenting said pretreated biomass (i.e., softwood) hydrolyzate with *Saccharomyces cerevisiae,* because all the prior art references (i.e., Perego et al., Jeffries et al., and Leonard et al.) teach methods to ferment pretreated biomass hydrolyzate to ethanol, a fuel/chemical. While, Perego et al. teach pretreating said biomass hydrolyzate with fly ash (fly ash comprises titanium oxide) to render said biomass hydrolyzate amenable to yeast fermentation, Jeffries et al. teach that hardwood or softwood hydrolyzates are interchangeably applicable for biofermentation of wood sugars to ethanol, but softwood hydrolyzates yield higher ethanol. Leonard et al. compliment teachings from both Perego et al. and Jeffries et al., because Leonard et al. teach that said biomass hydrolyzate ethanolic fermentation is carried out with *Saccharomyces cerevisiae.* Thus, Jeffries et al. remedy the deficiency of softwood hydrolyzate in teachings from Perego et al., and Leonard et al. remedy the deficiency of *Saccharomyces cerevisiae* as the fermentative organism for bioconversion of wood sugars into ethanol in teachings from both Perego et al., and Jeffries et al.

It would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made to modify teachings from Perego et al. according to the teachings from Jeffries et al. and Leonard et al. to apply pretreated softwood hydrolyzate to prepare the fermentation medium for the conversion of said biomass (i.e., softwood) hydrolyzate into ethanol via fermenting said pretreated softwood hydrolyzate with *Saccharomyces*

cerevisiae, because each one of the prior art references teach pretreating said biomass hydrolyzate and subsequent fermentation of said pretreated biomass hydrolyzate into ethanol (i.e.., a fuel) via yeast mediated fermentation.

From the teachings of the cited references, it is apparent that one of ordinary skill in the art would have had a reasonable expectation of success in producing the claimed invention. Therefore, the invention as a whole was *prima facie* obvious to one of ordinary skill in the art at the time the invention was made, as evidenced by the references, especially in the absence of evidence to the contrary.

Conclusion

15. No Claims are allowed.

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Kailash C. Srivastava whose telephone number is (703) 605-1196. The examiner can normally be reached on Monday to Thursday from 7:30 A.M. to 6:00 P.M. (Eastern Daylight Saving, or Standard time).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Wityshyn, can be reached on (703) 308-4743. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 872-9306.

Kailash C. Srivastava, Ph.D.
Patent Examiner
Art Unit 1651
(703)-605-1196

September 16, 2003

Jon P. Weber, Ph.D.
Primary Examiner